Dico: A Multimodal Menu-based In-vehicle Dialogue System

Jessica Villing
Department of Linguistics
Göteborg University
Sweden
jessica@ling.gu.se

Staffan Larsson
Department of Linguistics
Göteborg University
Sweden
sl@ling.gu.se

Abstract

We present a demo of a set of dialogue system applications for controlling various devices in a truck. All applications use the GoDiS dialogue manager and implement multimodal menu-based dialogue (MMD) based on the menu structures of existing GUI interfaces.

1 Introduction

Dico is a multimodal in-car dialogue system application[1]. An obvious advantage of spoken dialogue in the vehicle environment is thath the driver does not have to take the eyes - and the attention - off the road.

In the original Dico application (Olsson and Villing, 2005), the dialogue system was able to control a cellphone. The main goal was to develop an interface that is less distracting the the driver, and thus both safer and easier to use than existing interfaces. In an in-vehicle environment, it is cruicial that the system is intuitive and easy to use. GoDiS' dialogue manager allows the user to interact more flexibly and naturally with menu-based interfaces to devices.

Today's vehicles typically contain several devices that the driver needs to control, many of them with menu-based interfaces. To show how a multimodal dialogue system can help when controlling several devices, Dico has been extended with a DID (Driver Information Display) and a radio.

[1]The work reported here was funded by TALK (Talk And Look, Tools for Ambient Linguistic Knowledge), EC project IST-507802, and DICO, Vinnova project P28536-1

2 GoDiS and TrindiKit

Dico is developed using the dialogue system GoDiS (Larsson, 2002). GoDiS is implemented using TrindiKit (Traum and Larsson, 2003). General dialogue management issues such as feedback, grounding, question accommodation and task switching are handled by the application-independent dialogue manager. Re-using these technologies in new applications enables rapid prototyping of advanced dialogue applications. GoDiS has been adapted to several different dialogue types, domains, and languages, including menu-based multimodal dialogue when acting as an interface to an mp3 player (Hjelm et al., 2005).

3 The Dico application

When the user starts Dico she is asked to choose one of the three applications. Later in the interaction she is allowed to switch to any application without having to return to the top application (Dico) first. The output in the radio and the DID applications is multimodal. The modalities, visual and acoustic, work in parallel in the sense that the same information is given on the screen and verbally.

The services offered by the cellphone application includes calling a name or a number, managing the phonebook, using the helper and changing the settings in the cellphone application. The radio station and the volume can be changed. It is also possible to ask for the current radio station and for available radio stations. In the DID application the truck driver can get information about the orders (such as where to pick-up and deliver goods) and information from the tachograph (driving, resting, working and waiting time).

4 GoDiS features in Dico

To enable a more natural and intuitive dialogue, GoDiS supports (among other things) accommodation, task switching and grounding.

4.1 Accommodation

Since the applications are based on existing menu interfaces, it is possible for the novice user to let the system take the initiative and guide the user through e.g. the phonebook menu.

For expert users, accommodation enables skipping through the menus and getting right to the point. Instead of navigating through a complicated and tiresome menu structure it is possible for the expert user to give all information in one utterance:

Ex. 1: "Call Lisa's home number"

4.2 Multiple simultaneous tasks and task switching

It is possible to start one dialogue to perform a task, and then start a subdialogue before the first task is completed. When the second task is completed the system automatically returns to the first task. This gives the user freedom to switch task at any time:

Ex. 2:

U: "Change Lisa's home number."
S: "Okay. Let's see. What phonenumber do you want instead?"
U: "Check my messages."
S: "You have got this message. . Hi! I have got a new home number, it is (031)234567. Best regards, Lisa."
S: "Returning to change an entry. What phone number do you want instead?"
U: "oh three one two three four five six seven."
U: "Okay. Changing Lisa's home number to oh three one two three four five six seven."

4.3 Feedback and grounding

The GoDiS dialogue manager provides feedback to make sure that the dialogue partners have contact, that the system can can hear what the user says, understands the words that are spoken (semantical understanding), understands the meaning of the utterance (pragmatical understanding) and accepts the dialogue moves performed in utterances.

Combining feedback on different levels makes it possible for the system to give explicit feedback on the user's input. E.g. the single user utterance "Lisa" gives positive grounding on the semantic level but negative on the pragmatic, resulting in a system utterance consisting of two feedbac moves and a clarification question: "Lisa. I don't quite understand. Do you want to add an entry to the phonebook, call a person, change an entry in the phonebook, delete an entry from the phonebook or search for a name?".

5 Future work

We plan to extend Dico to handle integrated multimodality on the input side. By "integrated multimodality" we mean that different modalities contribute with different parts of the dialogue, i.e. *"Play this [click]"* where the [click] is a mouse click at the selected song. Technolgies for integrated multimodality in menu-based applications have already been developed for other GoDiS applications (Hjelm et al., 2005) and these solutions will be re-used in Dico.

Ko (2006) found that a context-aware dialogue system can reduce the degree of user distraction while driving. Techniques for adding awareness of the driver's level of distraction to Dico, and adapting the dialogue accordingly (e.g. by pausing the dialogue when the driver's distraction level is high and resuming it later), will be investigated in the ongoing DICO project in cooperation withVolvo, TeliaSonera and KTH.

References

Jeongwoo Ko, Fumihiko Murase, Teruko Mitamura, Eric Nyberg, Masahiko Tateishi and Ichiro Akahori (2006). *Analyzing the Effects of Spoken Dialog Systems on Driving Behavior*. LREC 2006 Conference.

David Hjelm et. al. (2005). DJ GoDiS: Multimodal Menu-based Dialogue in an Asychronous ISU System in Gardent and Gaiffe (eds.) *Proceedings of the ninth workshop on the semantics and pragmatics of dialogue.*

Staffan Larsson (2002). *Issue-Based Dialogue Management*, PhD thesis, Department of Linguistics, Goteborg University.

Anna Olsson and Jessica Villing 2005 *Dico - a Dialogue System for a Cell Phone*, Master thesis, Department of Linguistics, Goteborg University.

David Traum and Staffan Larsson 2003 *The Information State Approach to Dialogue Management*. In Smith and Kuppevelt (eds.): Current and New Directions in Discourse I& Dialogue, Kluwer Academic Publishers, 325–353.